

## **Funded Research Project Summaries for FY 2007 at Montana State University**

### **Title: A Strategic Matching Investment in Agricultural Research Centers for Small Grains Research in Montana**

Principal Investigator: Dr. Jeff Jacobsen, Director

Amount Funded: \$267,300

#### **Objectives:**

Provide Agricultural Research Center personnel with resources to replace aging equipment and/or expand wheat and barley research capabilities.

### **Title: Evaluation of Various Materials and Practices Contributing Toward Economic Crop Production Under Flexible, Continuous and Other Cropping Systems in Montana**

Principal Investigator: Superintendents of Research Centers

Amount Funded: \$108,000

#### **Objectives:**

1. To evaluate the effects of differing systems on crop and variety performance under diverse environments represented across the Montana Agricultural Experiment Station – Research Center network.
2. To evaluate the potential fit of other materials, concepts and techniques with various cropping systems employed.

### **Title: Winter Wheat Breeding/Genetics**

Principal Investigator: Phil Bruckner

Amount Funded: \$70,000

#### **Objectives:**

1. Develop improved cultivars of winter wheat adapted to Montana climatic conditions and cropping systems, which possess superior on-farm production characteristics (grain yield, winter hardiness, adequate and durable pest resistance, stress tolerance, agronomic characteristics) and superior end-use quality characteristics.
2. Isolate, as much as possible, our foreign wheat customers from variations in wheat quality performance by development and release of suitable cultivars and production research to develop strategies to maximize quality consistency for wheat produced in Montana.
3. Investigate environmental, genetic, and management factors which influence wheat productivity and end-use in Montana including 2006 projects: feasibility of combining low polyphenol oxidase (PPO) and high grain protein in wheat; and field verification of molecular markers for backcross transfer of stem solidness into elite lines.
4. Coordinate Montana Statewide winter wheat variety testing program and provide long-term performance data necessary for cultivar release decisions, variety recommendations, and producer management decisions.

### **Title: Spring Wheat Breeding and Genetics**

Principal Investigator: Luther Talbert

Amount Funded: \$70,000

#### **Objectives:**

- 1) Develop spring wheat varieties for Montana producers
- 2) Manage the variety testing program for Montana State University
- 3) Conduct experiments to improve the efficiency of the breeding program

**Title: Developing Improve Barley Varieties for Montana Farmers**

Principal Investigator: Dr. Tom Blake

Amount Funded: \$60,000

**Objectives:**

- 1) Develop, release and have adopted improved malt barley varieties
- 2) Improve our understanding of the genetic bases of variation for quality and adaptation
- 3) Lay the groundwork for improved drought tolerance in Montana-adapted germplasm

**Title: Breeding Between Market Classes of Wheat**

Principal Investigator: Jaime D. Sherman

Amount Funded: \$40,000

**Objectives:**

- 1) Use recently developed molecular markers to interconvert current spring and winter wheat varieties.
- 2) Develop the tools to allow inter-conversion of red and white-seeded wheat breeding germplasm.
- 3) Develop protocols for routine marker screening for spring and winter wheat.

**Title: Monitoring and Redistribution of Wheat Stem Sawfly Parasitoids**

Principal Investigator: David Weaver

Amount Funded: \$33,000

**Objectives:**

- 1) To continue a pilot program that is monitoring the population growth inoculatively established sawfly parasitoids on farms where historically there was sawfly damage in the presence of negligible parasitism. This project is conducted in direct collaboration with selected wheat producers and wheat grower organizations and aims to evaluate the continuing success of these parasitoids at the fifteen farms listed above.
- 2) This year we also wish to establish ten new sites throughout Montana to continue the process of translating parasitoid redistribution and conservation to Montana wheat growers. Therefore, these ten new sites will be established with input from both County Agents and Grower Organizations. These sites will not be monitored for long-term population dynamics, due to the fact that we are at maximum capacity for long term monitoring.

**Title: Improved Quality of Montana Hard Red and Hard White Wheats**

Principal Investigator: Deanna Nash

Amount Funded: \$30,000

**Objectives:**

1. Evaluate end-use quality of hard red and hard white wheat lines developed by MSU spring and winter wheat breeding programs.
2. Showcase Montana's newest varietal releases for visiting Trade Teams while they tour the Cereal Quality Lab (CQL) testing facilities.
3. Participate in the milling and baking contests for the Central Montana Fair and the Chouteau County Fair.
4. Promote Montana wheat quality by conducting tours and hands-on demonstrations through the Cereal Quality Lab to interested students, faculty and legislators.
5. Participate in research projects, designed to determine ways to improve end-use quality parameters of new wheat varieties, by cooperating with Montana Agricultural Experiment

Station researchers and producers as well as cooperating with the general public and industry to improve cereal quality.

6. Refine extensibility testing methods in the CQL.

**Title: Follow the Grain – STUDENT SCHOLARSHIPS (Long-Term Funding)**

Principal Investigator: David Buschena

Amount Funded: \$20,000

**Objectives:**

To establish long-term funding for the course “Follow the Grain,” AGECE 315. The funding will provide for a leadership-level commitment to initially establish a permanent endowment for student scholarships for this course, and will be more than matched by funding from industry and other sources. Once successful, this funding effort will provide student scholarships for students taking the course, or its successor, in perpetuity.

**Title: Managing Root and Soil Health for Montana’s Wheat**

Principal Investigator: Dr. Alan T. Dyer

Amount Funded: \$14,000

**Objectives:**

1. Amplify spring and winter wheat lines with resistances to Fusarium crown rot and root lesions nematodes (*Pratylenchus thornei* and *P. neglectus*)
2. Evaluate the impacts of root lesion nematodes (*Pratylenchus thornei* and *P. neglectus*) on Montana’s re-cropped wheat acreage.
3. Determine the mycorrhizal fungal community composition in wheat plants of varying Fusarium crown rot severity.

**Title: Enhanced Field Selection for Wheat Stem Sawfly Resistance**

Principal Investigator: Phil Bruckner

Amount Funded: \$14,000

**Objectives:**

1. Subject early-generation segregating winter wheat bulk populations and derived lines to heavy selection pressure for wheat stem sawfly (WSS) resistance and select plant phenotypes resistant to WSS infestation and cutting damage.
2. Evaluate spring and winter wheat cultivars and advance lines for resistance to infestation and cutting damage by WSS and for yield performance under heavy infestation by WSS.
3. Systematically evaluate selected germplasm for enhanced stem solidness and alternative sources of WSS resistance.
4. Provide field sites, representative of sawfly-infested production regions, for research and demonstration to producers of effective sawfly management strategies including use of resistant cultivars.

**Title: Evaluation Winter Wheat Germplasm with Different Levels of Polyphenol Oxidase and Grain Protein for Noodle and Bread Quality**

Principal Investigator: Phil Bruckner

Amount Funded: \$12,000

**Objectives:**

1. Evaluate selection groups that represent high and low protein and high and low polyphenol oxidase for agronomic and bread and noodle quality.

2. Use known DNA markers to screen winter wheat varieties and segregating populations for high and low polyphenol oxidase.

**Title: Herbicide Injury Potential to Montana Wheat Varieties**

Principal Investigator: Bob Stougaard

Amount Funded: \$12,210

**Objectives:**

Determine if wheat varieties differ in tolerance to recently developed herbicides, and assess herbicide effects on stem pith development.

**Title: Follow The Grain – COURSE ACTIVITIES (Producer Outreach)**

Principal Investigator: David Buschena

Amount Funded: \$10,000

**Objectives:**

To establish long-term funding for the course activities in “Follow the Grain,” AgEcon. 315. This funding will provide for a leadership-level commitment to establish initial funding for this course, and will be more than matched by funding from industry and other sources. Course activities include faculty travel, distance delivery systems, and in-state class travel expenses. Once successful, this funding effort will support the course, or its successor.

**Title: Early Generation Durum Selection and Germplasm Improvement**

Principal Investigator: Joyce Eckhoff

Amount Funded: \$10,000

**Objectives:**

- To produce improved durum germplasm for development of varieties for Montana producers
- To develop value-added characteristics in durum for manufacture of specialty products

**Title: Comparing Low and High Input Strategies in Diversified Cropping Systems**

Principal Investigator: Perry Miller

Amount Funded: \$9,240

**Objectives:**

1. Compare diversified no-till and organic cropping systems for crop productivity and quality and resource use efficiency.
2. Compare low and high input strategies for crop productivity and quality and resource use efficiency.

**Title: Wild Oat Control with Silverado and Osprey in Malt Barley**

Principal Investigator: Steven R. King

Amount Funded: \$8,000

**Objectives:**

Evaluate the control of wild oat in malt barley with the herbicides Silverado and Osprey in Montana. To determine the tolerance of malt barley to applications of the two herbicides applied alone or in

combination with various small grain herbicides. This is the second year of a two year study. In this second year, I plan to repeat the study in order to confirm the preliminary results obtained in 2005.

**Title: Evaluation of Small Grains for Ethanol Production**

Principal Investigators: Joyce Eckhoff

Amount Funded: \$5,000

**Objectives:**

- To identify best available barley, spring wheat, winter wheat, and durum varieties and new experimental lines for starch content and ethanol production.

**Title: Wood Seedbank composition and Dynamics of Four Common Annual in Small Grains Renewal**

Principal Investigator: Fabian Menalled

Amount Funded: \$7,307

**Objectives:**

1. Assess weed seedbank composition in representative small grain fields of Montana.
2. Quantify seedbank dynamics in a spring wheat-fallow system with varying burial depth, seeding density, and row spacing.
3. Generate a computer simulation model to analyze the importance of environmental and management variables in seedbank dynamics.

**Title: Evaluation of Spring Wheat for Hessian Fly Infestation and Tolerance**

Principal Investigator: Sue Blodgett

Amount Funded: \$4,675

**Objectives:**

- 1) Rate 20 spring wheat varieties for Hessian fly and wheat jointworm infestation.
- 2) Evaluate insecticide seed treatments and tillage for HF control.
- 3) Determine Hessian fly seasonal occurrence and abundance in area spring wheat crops.
- 4) Determine the presence and infestation level of wheat jointworm in Montana spring wheat.

**Title: Continuing as an Underwriter for MONTANA AG LIVE!**

Principal Investigator: Jack Rieseeman

Amount Funded: \$2,500

**Objectives:**

MONTANA AG LIVE! Underwriting will create three benefits for the Montana Wheat and Barley Committee:

1. The Committee will receive significant public exposure at modest cost. Underwriters are listed monthly in the KUSM program guide, which is received by the 5500 members of Montana Public Television. In addition, underwriters receive on-air credits during each of the 16 weekly programs.
2. The Committee will help to provide grain producers and agricultural businesses with timely and relevant answers to their questions in a cost-effective manner.
3. The Committee will help interpret the day-to-day issues facing ag producers to non-ag audiences. Given the growing tensions in some sectors of Montana between producers and non-producers, a forum such as MONTANA AG LIVE!, where the needs of farmers are clarified and addressed, offers a rational atmosphere for increased public awareness.

**Title: Ag Appreciation Weekend 2006**

Principal Investigator: Dr. Jeff Jacobsen

Amount Funded: \$1,000

**Objectives:**

Provide students in the College of Agriculture at Montana State University the opportunity to represent MSU at regional and national contests, conferences, and other important events by raising funds during MSU's Ag Appreciation Weekend, November 2006, through corporate sponsorships and donations. Showcase agriculture and outstanding agriculturists in Montana during Ag Appreciation Weekend.